A Fern Collection from Chihuahua

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The pteridophytes discussed in this paper were collected in the west-central part of the State of Chihuahua, Mexico, during 1938–40. It appears that few fern collectors have stopped long in Chihuahua, repelled perhaps by the arid nature of the terrain as seen from car or train. However, in the western part of the State rises the lofty and beautiful Sierra Madre, pierced by innumerable deep barrancas, and it is in this region that we find many habitats suitable for ferns and their allies.

Collections were made at Mojarachic, Maguarichic, and Recuvichic, in the District of Rayon, and also at San Juanito, District of Benito Juarez. A few ferns were collected in the remarkable Barranca de Cobre, in Andres del Río District, a canyon well over 5000 ft. deep in one spot. The base camp was at Mojarachic, a town not far south of Uriachic, at an altitude of 6900 ft.

Cyrus Guernsey Pringle penetrated Chihuahua as far as San Antonio, and other collectors to San Juanito and Creel. I have not seen any plant records from Mojarachic, Recuvichic, Maguarichic, or the Barranca de Cobre, and several of my records are extensions of range. These are marked in the following list by asterisks. To the late Arthur N. Leeds, to Dr. Wherry, Dr. Maxon, and Mr. Morton thanks are due for determining many of the specimens and checking the range of the species. Specimens representing most of the collections here recorded have been placed in the U. S. National Herbarium and in the herbarium of the Academy of Natural Sciences of Philadelphia. The numbers following the localities in this paper are those on the author's specimens.

SCHIZAEACEAE

ANEMIA ANTHRISCIFOLIA Schrad.

A stunted, sterile specimen collected on a dry talus slope; doubtfully referred to this species.—Barranca de Cobre, no. 7022.

POLYPODIACEAE

ELAPHOGLOSSUM PILOSUM (H. & B.) Moore

The distribution of this species in Mexico is uncertain. In western Chihuahua it grew on shaded, moist, north-facing cliffs, with a soil reaction of 5.0.—Recuvichic, no. 5944; Mojarachic, nos. 5545, 5963.

*POLYPODIUM GUTTATUM Maxon

Known previously from the states of Zacatecas, Nuevo Leon, Coahuila, Hidalgo, and San Luis Potosí. In our region it grew in pine woods among rocks, with the soil neutral (pH 7.0).—Mojarachic, nos. 5060, 5476, 5550, 5955.

POLYPODIUM HARTWEGIANUM Hook.?

Delicate, immature material, identified tentatively as this species.—Mojarachic, nos. 5549, 5957.

POLYPODIUM SUBPETIOLATUM Hook.

Two collections are tentatively referred to this widespread Mexican species, although they differ in minor details from typical material.—Mojarachic, nos. 5542, 5930.

*POLYPODIUM POLYPODIOIDES (L.) Watt. var. ACICULARE Weatherby

This variety is much commoner and more widely distributed in Mexico than the two other varieties known from Mexico. It has not previously been recorded north of Durango. In our region it grew in shaded arroyos with a soil reaction of 4.0.—Mojarachic, nos. 5543, 5977.

POLYPODIUM THYSSANOLEPIS A. Br.

This species extends from Texas to Arizona, throughout Mexico, and well into South America, besides occurring in

the West Indies. I found it in shaded rock crevices with a pH of 6.0–7.0.—Recuvichic, no. 5945; Maguarichic, no. 5966.

*POLYPODIUM POLYLEPIS Roem.

Common in southern Mexico, but not previously known north of San Luis Potosí and Guanajuato. I found it on rocks in pine woods with a neutral soil reaction (pH 7.0).—Mojarachic, nos. 5475, 5544, 5951.

POLYPODIUM AUREUM L. var. AREOLATUM (H. B. K.) Eaton

Local, in shaded rock-crevices.—Mojarachic, nos. 5043, 5568.

ADIANTUM CAPILLUS-VENERIS L.

A common pantropic species, collected previously in Chihuahua by Pringle and by Edw. Palmer. I found it on moist, perpendicular cliffs, where the soil had a pH value of 8.0.—Recuvichic, nos. 5064, 5943; Mojarachic, no. 5553; Barranca de Cobre, nos. 7012, 7013, 7016.

ADIANTUM POIRETII Wikstr.

This species also is widely distributed in Mexico and extends southward throughout South America. The roots are tucked well under rocks in the beds of arroyos.—Recuvichic, nos. 5065, 5571, 5942; Mojarachic, nos. 5939, 5964; Barranca de Cobre, no. 7017.

BOMMERIA HISPIDA (Mett.) Underw.

A common rock fern of Mexico and the southwestern United States. I found it in rather dry shade, often associated with *Selaginella rupincola*. The soil reaction ranged from 7.0 to 8.0.—Mojarachic, nos. 5458, 5581, 6009.

BOMMERIA KNOBLOCHII Maxon

This recently described species is based on no. 6044, from Mojarachic, which is the only known collection.

CHEILANTHES ANGUSTIFOLIA H. B. K.

This species, listed as *Pellaea angustifolia* by Conzatti, is widespread in Mexico. In our region it grew profusely

on half-shaded, rocky slopes, with a soil reaction ranging from very acid (pH 4.0) to neutral.—Mojarachic, nos. 5045, 5059, 5405, 5948, 5976.

*CHEILANTHES CUCULLANS Fée

This rather rare species has previously been known only from southern Mexico, in Morelos, Puebla, and Michoacán. Its favorite habitat is in half-shaded rock crevices.—Maguarichic, no. 5933.

CHEILANTHES EATONII Baker

Wiggins (1939) does not record this species from Mexico, but Pringle collected it in Chihuahua, and Maxon (1919a) knew it as ranging into Mexico as far south as Puebla. It grows at Mojarachic in the same situations as *C. tomentosa* and, in fact, was most often associated with the latter. It grew in neutral soil.—Mojarachic, no. 7069.

CHEILANTHES FARINOSA (Forsk.) Kaulf.

A widespread species found from Mexico to Peru, and also in the Old World. Pringle collected it in Chihuahua at Arroyo Ancho. It grew sparingly in the region here studied, in moist, shaded arroyos, with a neutral soil reaction.—Mojarachic, nos. 5046, 5547, 6026.

CHEILANTHES KAULFUSSII Kunze

An abundant species, ranging from Texas south to Colombia. It prefers half-shaded rock crevices with a neutral soil reaction.—Mojarachic, nos. 5404, 5975, 8001; Barranca de Cobre, no. 7009.

CHEILANTHES LENDIGERA (Cav.) Swartz

This species ranges from southern Arizona to the Andes of South America. It is not uncommon in Mexico according to Maxon (1939). It has been collected in Chihuahua by Pringle. I found it on moist, shaded talus slopes with a neutral soil reaction.—Mojarachic, nos. 5068, 5069, 5469, 5931, 5970, 6007.

CHEILANTHES LEUCOPODA Link

A rather common species occurring from Texas to southern Mexico. Several collectors have found it in

Chihuahua.—Mojarachic, no. 5950.

CHEILANTHES LINDHEIMERI (J. Smith) Hook.

Found from Texas to Arizona and south to San Luis Potosí and Durango. Pennell has collected it in Chihuahua. In our region it grew in half-shaded rock crevices with a neutral soil reaction.—Mojarachic, no. 6030.

CHEILANTHES PYRAMIDALIS Fée

Pringle collected this fern in Mapula Canyon, Chihuahua. It is a common species in Mexico. I found it in shady rock crevices and on rocky slopes with a soil reaction varying from pH 5.0 to 7.0.—Mojarachic, nos. 5470, 5580, 5953.

*CHEILANTHES TOMENTOSA Link

West Virginia to Texas, extending into Mexico as far south as San Luis Potosí. In our region it grew on shady slopes with a decided acid soil reaction of 5.0. Broun notes that in the United States this species grows in non-calcareous soil eastward, but toward the southwest it withstands alkaline conditions.—Recuvichic, nos. 5066, 5552, 5946; Mojarachic, nos. 5471, 5972, 8004.

CHEILANTHES WRIGHTII Hook.

Pringle collected this species in Chihuahua, and Wiggins records it for the Sonoran desert. It grows only as far south as Durango. At Mojarachic it occurs in exposed rock crevices with a soil reaction of 7.0 to 8.0.—San Juanito, no. 5420; Mojarachic, nos. 5048, 5579, 5980.

NOTHOLAENA AUREA (Poir.) Desv.

This very common xerophyte has usually been known under the names *N. bonariensis* or *N. ferruginea.* It is the most common of our ferns, growing abundantly on dry, exposed slopes. The soil reaction was 4.0.—Mojarachic, nos. 5054, 6006.

NOTHOLAENA CANDIDA (Mart. & Gal.) Hook.

A wide-ranging Mexican species, extending north into Texas and New Mexico. It grows locally in dry, exposed

situations, and can be collected only in the rainy season. —Maguarichic, nos. 5929, 6028; Barranca de Cobre, no. 7021.

NOTHOLAENA GRAYI Davenp.

I was able to find but two plants of this species, which is listed by Conzatti from Jalisco, Chihuahua, San Luis Potosí, and Coahuila. It is found also in Sonora, and extends across the Mexican border into the United States. —Maguarichic, no. 7071.

NOTHOLAENA INCANA Presl

A common species in Mexico, which has usually been known as *N. nivea*. It grew in dry, exposed rock crevices with a neutral soil reaction.—Maguarichic, no. 6027; Mojarachic, nos. 5960, 5961, 6032, 8026.

NOTHOLAENA LIMITANEA Maxon

This grows in dry, exposed rock crevices with a neutral to slightly alkaline reaction (8.0). The first two numbers cited belong to subsp. *mexicana* Maxon, which was based on a Pringle collection from the Santa Eulalia Mountains, Chihuahua.—Mojarachic, nos. 5401, 5582, 8027.

NOTHOLAENA SINUATA (Lag.) Kaulf.

This wide-ranging species is known from Oklahoma to Chile. It is very common over much of its range. I found it growing mostly in half-shaded rock crevices with a neutral soil reaction.—Maguarichic, nos. 5402, 5935; Mojarachic, nos. 5941, 9007.

NOTHOLAENA STANDLEYI Maxon

In assigning this name to the species described under the preoccupied name *N. Hookeri*, Maxon (1915) noted the range as from the southwestern United States to southern Mexico.—Maguarichic, no. 8300.

PELLAEA ALLOSUROIDES (Mett.) Hieron.

This endemic Mexican species grew in exposed situations above arroyos. The soil reaction varied from 5.0 to 7.0.—Mojarachic, nos. 5579, 5981.

PELLAEA SAGITTATA (Cav.) Link

A widespread species in Mexico, a synonym being *P. cordata* (Cav.) J. Smith, not Fée. It grew sparingly in our region and always in shaded oak woods in neutral soil.—Mojarachic, nos. 5052, 5455, 5940, 5983.

PELLAEA TERNIFOLIA (Cav.) Link

Common throughout Mexico. It grows in our region in rather exposed, dry places, usually at the base of rocks.—Mojarachic, nos. 5042, 5058, 5489, 5567, 5570, 6002.

PTERIDIUM AQUILINUM (L.) Kuhn var. PUBESCENS Underw.

This United States fern is not common in Mexico, being known there only from Baja California, Chihuahua, and Durango. In Chihuahua it grew on open slopes, under pines, or along streams. It is an acid-loving fern, growing in soils with a reaction of 4.0.—Mojarachic, nos. 5548, 8019.

ASPLENIUM EXIGUUM Bedd.

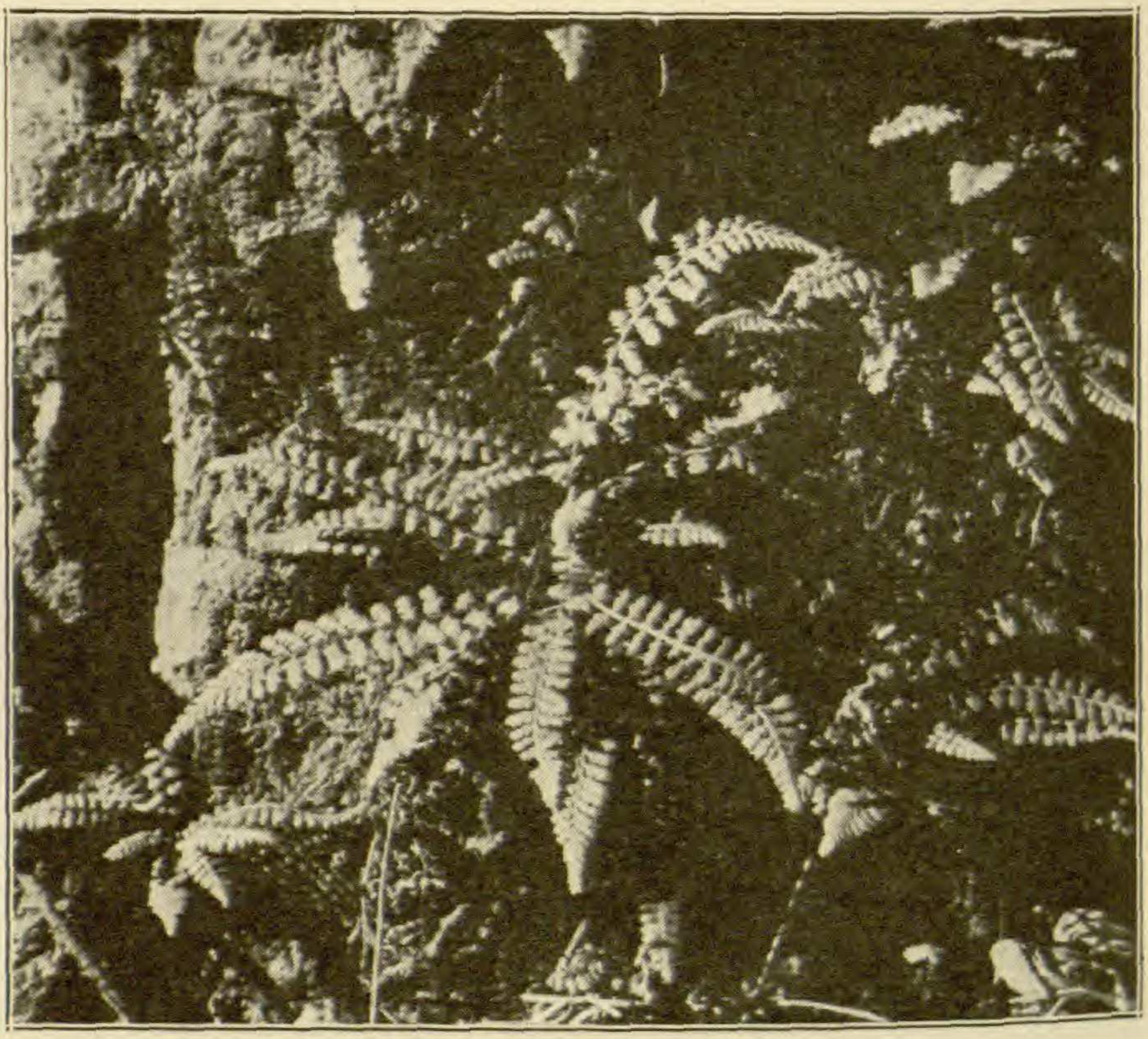
This Asiatic fern was recorded for Mexico by Hooker as early as 1868; a synonym is *A. Glenniei* Baker, founded on Mexican material. It grows from Arizona south to San Luis Potosí. It is rare in our region, growing best on shaded, moist banks. The pH of the soil was 5.0.—Mojarachic, nos. 5540, 5932, 5962.

ASPLENIUM MONANTHES L.

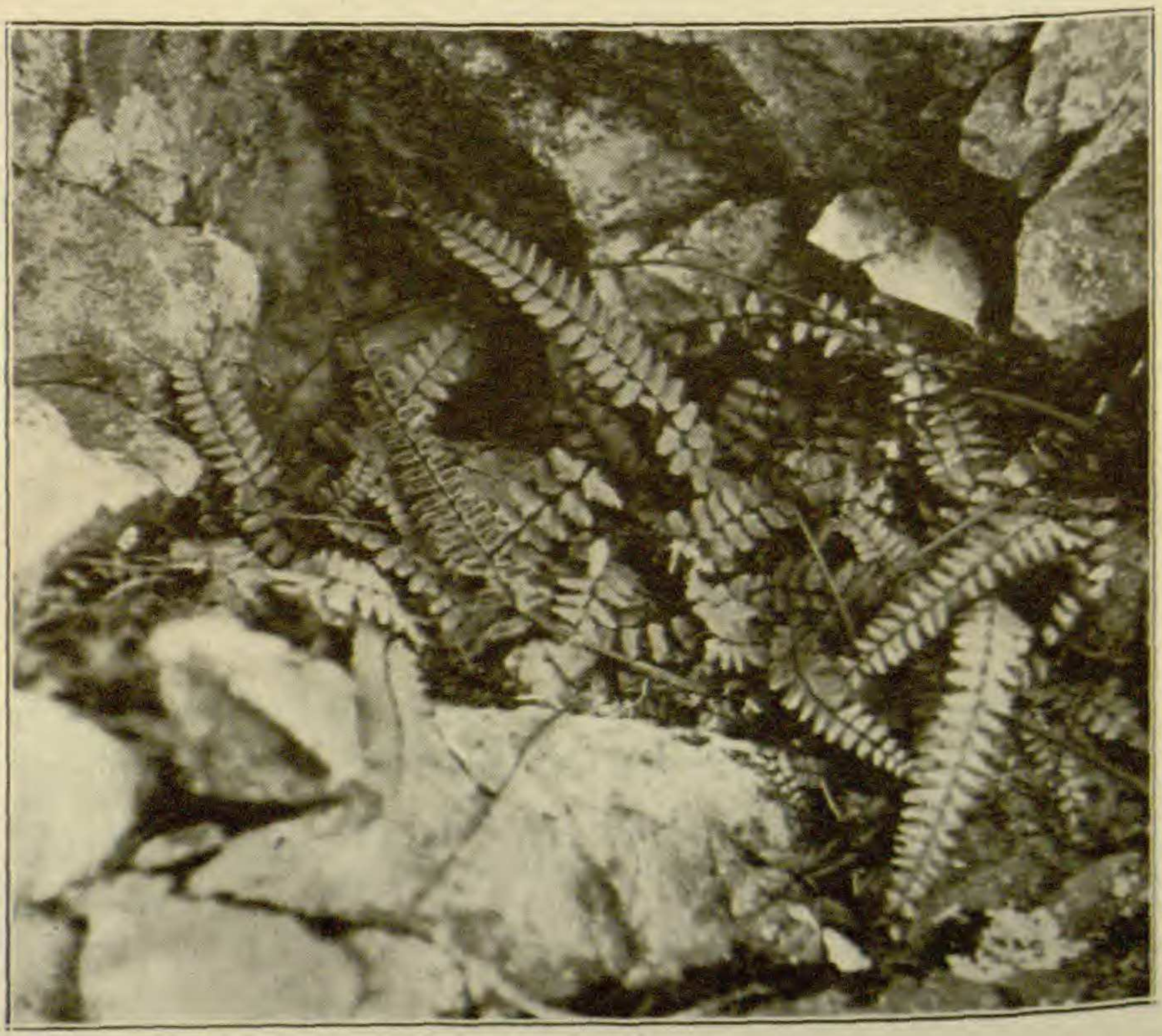
This highly variable, widespread spleenwort has been found nearly throughout Mexico. In our region it grew on thinly covered shaded rocks with a neutral soil reaction.—Mojarachic, nos. 5468, 5956, 6025, 8018.

ASPLENIUM PALMERI Maxon

This species is well known in Chihuahua and many other parts of Mexico (Maxon, 1921). In our region it grows in shaded rock crevices with a neutral soil reaction.—Maguarichic, no. 5967; Mojarachic, no. 8002; Barranca de Cobre, no. 7008.



Asplenium exiguum at Mojarachic.



Asplenium Palmeri at Maguarichic.

ASPLENIUM RESILIENS Kunze

A widespread fern ranging from Pennsylvania to Peru. At Mojarachic it grew in shaded crevices with a pH of 6.0. Broun (1938) gives its habitat as cliffs of limestone and other calcareous rocks, which holds for the United States (Wherry, 1920). It is evidently tolerant to slight acidity in the climate of Chihuahua.—Mojarachic, nos. 5055, 6010.

*ATHYRIUM ASPLENIOIDES (Michx.) Desv.

This Lady-fern has been known heretofore chiefly in the United States, from Massachusetts to Texas. It does grow also sparingly in Mexico, and has been collected in Durango. At Mojarachic its favorite habitat is under overhanging rocks in arroyo beds where even in the dry season there may be some moisture. As with most of the local species, however, it dies down during the latter part of the dry season. The pH value is neutral. In the United States, Wherry (1921) found it tolerant of a wide range of soil reaction.—Mojarachic, nos. 8007, 8017.

*PLAGIOGYRIA SEMICORDATA (Presl) Christ

Not common, and not previously known north of Durango. The specimens probably belong to the form described as *P. arguta* (Fée) Copel. It grows here in full sun in arroyos with a soil reaction of 5.0.—Mojarachic, nos. 5051, 5947.

DRYOPTERIS PATULA (Sw.) Underw.

The small representative of the species found here resembles some material which has been identified by Christensen with his variety *Rossii*, although it does not agree with his description very well. I found this on sunny banks along arroyos and in neutral soil.—Mojarachic, nos. 5569, 5959, 5968, 6004, 6005.

DRYOPTERIS FEEI C. Chr.

A well-known fern of Mexico, reaching Arizona and California. Locally it grows in moist shade, with its roots

always under rocks. The soil is neutral.—Mojarachic, nos. 5551, 5973, 6003; Barranca de Cobre, no. 7037.

DRYOPTERIS PILOSA (Mart. & Gal.) C. Chr.

This species is not very common, but is found over a wide area from Sonora and Chihuahua to Puebla and Morelos. It is quite uncommon here with us. At Mojarachic it grows small and dwarf on dry rocks. At Creel it was larger and more typical, growing under overhanging, shaded rocks along a little stream.—Mojarachic, no. 5047; Creel, no. 7042.

PHANEROPHLEBIA AURICULATA Underw.

The minute, yellowish glands occasionally found on other specimens of this species are particularly abundant on this collection, which was found in moist soil in a deep shaded canyon.—Barranca de Cobre, no. 7011.

WOODSIA MEXICANA Fée

Pringle collected this species in Chihuahua, and it has been found a good many times elsewhere in Mexico and the southwestern United States. It grew best in shaded arroyos with a soil reaction of 7.0 to 8.0.—Mojarachic, nos. 5472, 5546, 5954, 5971, 8003.

*WOODSIA MOLLIS (Kaulf.) J. Sm.

This common species has not previously been collected in Chihuahua, although it is known from the adjoining states to the south, Sinaloa and Durango. In Chihuahua it grew very sparingly, with its roots well tucked under rocks and boulders. The soil was slightly acid (6.0).—Mojarachic, no. 5958.

CYSTOPTERIS FRAGILIS (L.) Bernh.

This cosmopolitan fern is quite common in Mexico, occurring in several forms. In our region it grew on moist banks in an alkaline soil (pH 8.0). Wherry has noted that this species prefers alkaline soil, but that it is tolerant of acidity.—Mojarachic, nos. 5538, 5546, 5952.

DENNSTAEDTIA SP.

A moderate-sized representative of this genus was collected in the Barranca de Cobre, growing in moist soil, where it was quite common. It is obviously related to *D. rubiginosa* and *D. mexicana*, but can not be definitely assigned to either.—Barranca de Cobre, no. 7025.

MARSILEACEAE

MARSILEA VESTITA Hook. & Grev.

This Pepperwort is not common in Mexico, but its exact range is uncertain. I found it growing in rather quiet water.—San Juanito, no. 5417.

EQUISETACEAE

*EQUISETUM FUNSTONII A. A. Eaton

On the map published by Schaffner (1939), dots representing collections of this species are shown both to the north and south of Chihuahua, but none in that state. I found it in moist soil alongside an arroyo.—Mojarachic, no. 7077.

EQUISETUM LAEVIGATUM A. Br.

On Schaffner's map for this species there is a locality-dot in Chihuahua near the Rio Grande, but none elsewhere in the state.—Mojarachic, no. 5691.

PSILOTACEAE

*PSILOTUM NUDUM (L.) Griseb.

This primitive fern-ally has a wide distribution in Mexico, but is not common and has not previously been known from Chihuahua. It grew here in moist, shaded, rock crevices.—Barranca de Cobre, no. 7035.

SELAGINELLACEAE

SELAGINELLA CHRISMARI Hieron.

Only one collection of this little-known species was made. It was found growing in a dry rock crevice.—Maguarichic, no. 5928.

SELAGINELLA PALLESCENS (Link) Spring

A very common Mexican species, usually known as *S.*

cuspidata Link. I found it in shady, moist canyons with the soil neutral.—Mojarachic, nos. 5050, 5539, 5974, 6001.

*SELAGINELLA RUPINCOLA Underw.

Exposed, dry rock crevices were the favorite habitat of this species, which is known to occur in Mexico south to Jalisco, but which has not previously been found in Chihuahua. *Bommeria hispida* was frequently associated with it. The soil reaction varied from 7.0 to 8.0.—Maguarichic, no. 5936; Mojarachic, nos. 5573, 6000.

*SELAGINELLA WRIGHTII Hieron.

Uncommon in Mexico, and not previously found in Chihuahua. This and the preceding species belong to a section of *Selaginella* as yet little known in Mexico. It grows only in exposed rock crevices and prefers a neutral soil.—Maguarichic, no. 5938; Mojarachic, no. 5969.

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